BEFORE THE

OIL CONSERVATION COMMISSION

STATE OF NEW MEXICO
Santa Fe, New Mexico

October 17, 1957

TRANSCRIPT OF HEARING

Case 1326

DEARNLEY - MEIER & ASSOCIATES
INCORPORATED
GENERAL LAW REPORTERS
ALBUQUERQUE - SANTE FE
3-6691 2-2211

BEFORE THE
OIL CONSERVATION COMMISSION
STATE OF NEW MEXICO
Santa Fe, New Mexico

October 17, 1957

IN THE MATTER OF:	
Application of Southern California Production Corporation for an order promulgating special pool rules for the Teas Pool in the Potash-Oil Area in Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order promulgating special pool rules for the Teas Pool in the Potash-Oil Area in Lea County, New Mexico, to provide a casing program for wells drilled in said pool in lieu of the Shallow-zone Casing Requirements set forth in Order R-111-A.	Case 1326

BEFORE: Honorable Edwin L. Mechem
Mr. Murray Morgan
Mr. A. L. Porter

TRANSCRIPT OF HEARING

MR. PORTER: We will consider next Case 1326.

MR. COOLEY: Application of Southern California Production Corporation for an order promulgating special pool rules for the Teas Pool in the Potash-Oil Area in Lea County, New Mexico.

MR. WARREN: James A. Warren, who is appearing on behalf of the applicant.

MR. COOLEY: Do you desire to be sworn, Mr. Warren?

MR. WARREN: Yes.

(Witness sworn.)

JAMES A. WARREN

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. COOLEY:

Q Will you state your full name and position, please?

A James A. Warren, Division Engineer for Southern California Petroleum Corporation in Midland.

Q Mr. Warren, have you previously testified before the Oil Conservation Commission of New Mexico as an expert witness?

A Yes.

Q Are you familiar with the conditions in the Teas Pool in Lea County, New Mexico? A Yes, sir.

MR. COOLEY: Are the witness's qualifications acceptable?

MR. PORTER: Yes, they are.

Q Do you have a prepared statement in regard to this case?

A Yes, I have.

Q Will you please proceed?

A Application for this hearing was made to the New Mexico Oil Conservation Commission on September 26 by wire and copies of the formal application subsequently sent by certified mail to:

New Mexico Oil Conservation Commission, Santa Fe and Hobbs, New Mexico.
United States Geological Survey, Artesia, New Mexico.
Potash Company of America, Carlsbad, New Mexico.
Anderson-Prichard Oil Corporation, Midland, Texas.
W. H. Black, Operator, Midland, Texas.

The purpose of this application is for an order to establish special pool rules for the Teas Pool in the Potash-Oil Area in Lea County, New Mexico, to provide a casing program for wells to be drilled in said pool involving exceptions to the shallow-zone casing requirements of Commission Order R-111-A. Applicant has no intention of attempting to disprove the validity of Order R-111-A but proposes a casing program that will adequately protect potash deposits in this small area at considerably less expense to the oil operator than that required by Order R-111-A. Applicant's proposal is made as an optional casing program that an operator may follow in lieu of the shallow-zone casing requirements of Order R-111-A, which is similar to the casing program allowed in Case 1277 by Order R-1039 dated August 26, 1957, in the newly created Middle Lynch-Yates Pool.

We wish to submit a map of the Teas Pool and surrounding area as Exhibit A.

(Marked Southern California's Exhibit A, for identification.)

This map shows the boundary of the Teas Pool outlined in red, the boundary of the Potash-Oil Area in green, the names of those holding oil and gas leases in the area under consideration, and the location of productive and non-productive wells drilled in the area. The date of completion or abandonment, the depths to which casing was set or cemented, and the total depth of each well are listed beside each well location. The Potash Company of America holds all the potash permits in this area and all the acreage is

is owned by the Federal Government. I understand that the actual nearest mining operation for potash is ten miles west of this area.

(Marked Southern California's Exhibit B, for identification.)

Exhibit B is the same area with structural contours drawn on top of the frosted quartz grain zone near the top of the Yates formation. This frosted quartz zone was used to contour on because we feel it is a little more consistent than the actual top of the Yates sand. It's indication that the pool is nearly drilled up with the possible exception that there may be some extension of production to the east, but what I want to show is that the pool is relatively small and also the indication that the structure is not the entire reason for control of production. As I will mention later, the lithology has probably as much to do with it as the structure. For instance, there's a dry hole at a plus 387 as the Yates frosted quartz zone came in at plus 387, and there are other producers that are producing at a lower depth than that.

(Marked Southern California's Exhibit C, for identification.)

This strip log is submitted as Exhibit C which is a composite sample log showing a typical section of the formations as found in this pool, and showing the range of casing-setting depths as has been done in the past. May I move these exhibits be accepted in evidence?

MR. PORTER: Is there any objection to the admission

of these exhibits? They will be admitted. Are the exhibits properly identified? Then Exhibits A, B and C will be admitted as far as the record is concerned.

A I want to point out that although the pool boundaries go down into the north half of 25 and the northwest quarter of 30, this is the location of the original discovery well.

MR. PORTER: Will you give us the legal description of that?

A Of the point of this well?

MR. PORTER: The discovery well.

A The discovery well is located in the northeast quarter of the southeast quarter of Section 24.

The Teas Pool is located in west Central Lea County, New Mexico, about 30 miles southwest of Hobbs, just south of the Hobbs-Carlsbad highway. It contains 15 wells producing oil and a negligible amount of gas from the Yates formation at a depth of 3300 feet. Oil is produced from a total section of about 250 feet from several sand intervals and a porous dolomite interval within the Yates formation, each separated by impermeable strata. Completion is generally from about 35-85 feet of open hole. The occurrence of oil is apparently controlled by an inticlinal structural trap and varying lithology. The interval that is productive in one well is not necessarily productive in the adjacent well which makes it very risky for an operator to run the oil string without

first having seen a show of oil.

The Paul C. Teas "Dinnin No. 1-I", drilled to a depth of 3420 feet in Section 24, T20S, R33E, in March 1951 is credited with discovery of the pool. However, this well produced only about 3 months and was plugged and abandoned. Offset wells were drilled south and west of this well and were both dry. The present productive area of the pool lies principally in Sections 13 and 14, T20S, R33E -- over a mile north and west from the discovery well, and this is the area now under consideration since the southern portion within the pool boundary has been proven non-productive. The first well completed in the productive area was the Spartan "Federal-Turner No. 1-13-E", drilled to a depth of 3338 feet in June 1951. It was plagued by mechanical difficulties and was finally plugged and abandoned in May 1956.

The pool was developed principally during the period 1952 through February 1955, prior to the issuance of Commission Order R-111-A, at which time 20 wells had been drilled in and around the present productive area. Fourteen were pumping producers and 6 were non-productive. Since then, 3 more wells have been drilled, bringing the total wells drilled to 23, of which 15 produce oil by pumping, 1 producer is abandoned and 7 were non-productive. Oil production is averaging about 225 barrels per day for all 15 wells, or an average barrels per day per well of 15. Daily production per well ranges from 3 to 37, only 2 wells being capable of

producing more than the present top allowable of 37 barrels per day. Most of the wells produce a small amount of water but the oil and gas production is generally too small to measure. There is no gas sales outlet from the pool. Gas production has always been only little more than sufficient for lease use to run pumping unit engines and heater-treaters. Available gas for fuel has often been insufficient and earlier this year operators found it necessary to go to the additional expense of installing electric power for pumping unit operation. Seven wells are operated by W. H. Black; 7 by Southern California Petroleum Corporation; and 1 by Anderson-Prichard Oil Corporation.

Present cost for a completed well by the methods they have been drilled with in the past, is about $37,000; $42,000, with tank battery, road and location. Pay out on well cost alone based on present allowable is about 1½ years; since only 4 or 5 wells have produced top allowable this long, pay out period is generally much longer.

Commission Order R-111-A became effective October 13, 1955 and sets forth certain strict casing requirements for these shallow-zone wells which applicant considers an economic hardship on operators in this shallow pool. The productive area of the Teas Pool lies wholly within the horizontal and vertical limits of the shallow-zone Potash-Oil Area, as set forth by Order R-111-A.

Twenty-two of the 23 wells in this area have been drilled with

cable tools due to the low pressures in the zones penetrated. Drilling with rotary tools causes a high hydrostatic pressure to be exerted on the pay zone by the column of circulating mud and often causes low-pressure zones to be damaged to the extent that they cannot be made to produce. This may have been the reason for the non-productivity of the only well drilled in this pool by rotary tools - Western Drilling Co. "Anderson-Prichard No. 1-P" which is in the southeast quarter of the southeast quarter of Section 10, T20S, R33E. Apparently good pay sand was cored in this well, as operator ran oil string to bottom, cemented to the surface, perforated, fractured and attempted to produce it. Production was non-commercial and it was plugged and abandoned, although it is offset to the south and east by producing wells.

The cable tool drilling and casing program generally followed during the principal development of this pool has been as follows:

First, to set 13-3/8" casing at 60-110 feet in the top of the "Red Beds" to shut off possible fresh water in surface sands and gravels; since no water is present at this depth, this casing serves to prevent caving.

Second, set 10-3/4" casing at 550-670 feet in the "Red Beds" to prevent caving.

Third, set 8-5/8" casing at 900-1000 feet into the Dewey Lake formation immediately below the Santa Rosa water sands to shut off water. Water is found from about 625-900 feet in small quantity.

Each of these strings of casings have been set in the hole with 5-10 sacks of heavy mud around the shoe to obtain a temporary shut-off, the hole bailed dry and allowed to stand at least one hour, then the hole is checked with the bailer for entry of water or cavings to ascertain that a shut-off has been effected before drilling is resumed. Drill ahead through the Salado, or salt section, the Tansill dolomite, and into the Yates until an oil show is encountered. At this point, the size of the hole was reduced from 8" to 5" and the pay section drilled. Most wells reduced hole, although several did not, and the pay section was drilled with 8" hole. The amount of oil entering the hole while drilling the pay section would then determine whether or not an oil string would be run. Estimates of natural production were based on how much oil per hour could be bailed from the hole. Most productive wells had only from about 100 to 600 feet of oil enter the hole at this tage, with two having as much as 1500 feet. Non-productive wells have had similar amounts of salt water enter the hole or have been almost completely dry.

If the operator chose to run an oil string, then 5½" or 7" casing was run to the shoulder where hole was reduced at or near the top of the pay section or hung at this point if hole was not reduced, and the casing either tacked with a small volume of cement for further testing or treating, or if the operator was confident of obtaining commercial production, cemented for final completion.

Also, before the oil string was run, a plug of cal-seal or hydromite was usually set in the hole above the pay section to protect the pay from the hydrostatic pressure of the heavy column of cement. Most oil strings were cemented with 300-500 sacks with 4-10% gel in an attempt to circulate the cement to the surface. Four of the wells were cemented with 100-200 sacks at the shoe of the oil string and then with 150-300 sacks through a stage collar in the string at a depth opposite the anhydrite just above the salt section. If cement did not circulate to the surface small pipe would be run as far as possible in the hole outside the oil string and the hole filled to the surface with cement.

If the oil string had been tacked with a small volume of cement for testing purposes, the casing would then be perforated just above the top of the cement as determined by a temperature survey and the oil string recemented to the surface.

Casing centralizers were used on the oil string in wells drilled by applicant and placed in the anhydrite above the salt and in the Tansill dolomite section below the salt. In all except one of the productive wells in which an oil string was cemented, the upper strings of casing that were set or mudded in for protection were pulled prior to cementing the oil string.

All wells have been completed on the pump due to the low pressure of the oil zones, all except one are completed from open hole, all except two have required stimulation treatment on initial

completion -- the exceptions being wells producing from the porous dolomite in the NW¼ of Section 14, no blow-outs or water flows have occurred; in fact, the only fluids encountered in this pool are the Santa Rosa salt water, oil and/or salt water in the Yates.

The differences in lithology between pay zones in the same well require different types of stimulation treatment -- acid for the dolomite and sand-fracting for the sands. If more than one sand interval in the same well is productive, it has been demonstrated that one sand will treat at a different pressure than another, thereby causing waste by ineffective treatment of all pay intervals in an open hole completion as well as possibly allowing one interval to thief oil from another. Applicant is now faced with the problem of how to economically and effectively work over the wells completed in open hole in an attempt to increase oil recovery. Applicant, therefore, holds that pool rules that will allow oil strings to be set in a practical manner through pay zones for selective perforating and treating will allow more efficient and complete recovery of oil.

Section IV (2) a of Order R-111-A requires surface casing to be set and cemented solid in the basal Rustler formation immediately above the salt section which occurs at a depth of 1400-1700 feet in this pool. Applicant requests an exception to this requirement by maintaining that mudding in of 3 strings of casing down to approximately 1000 feet as was allowed by Order R-1021 dated

July 17, 1957, in Case 1274 and pertaining to the drilling of Applicant's "Federal-Bobb C No. 1-G", will give the necessary protection to the potash from shallow water. $6,000-7,000 would be saved by the operator by exception to this requirement.

However, we have had a meeting with the potash people and with the United States Geological Survey representatives, and find that the United States Geological Survey states that they will require surface casing to be cemented to at least 1,000 feet or the estimated depth of the lowest water, which is the deepest that we have found in this pool is 900 feet.

Now in Section IV (3) a and b (i) of Order R-111-A requires a salt protection string to be set between 100 and 600 feet below the base of the salt section but in any event, above the highest known oil or gas zone and cemented with a nominal volume of cement for testing or circulated to the surface. Since the oil zone, if present, generally occurs in this pool about 200 feet below the base of the salt, this requirement practically forces an open-hole completion and makes the salt-protection string and the oil string one and the same. Due to the low reservoir pressure and low fluid levels encountered throughout this pool during its development and the fact that the hole is open at the surface while the pay section is drilled, Applicant holds that an exception to this requirement would not damage the potash reserves. Applicant's interpretation of this requirement is that it protects the salt section principally from

being saturated with gas under pressure. Cementing of the oil strings to the surface according to Section IV (5) a then would give the necessary protection and satisfy the requirements pertaining to the setting and cementing of the salt protection string and, further, would allow an operator to set pipe through pay zones if desired, without undue additional expense.

I would estimate this additional expense on the order of $2,000 to 4,000.

Applicant, therefore, proposes that the Commission write Special Pool Rules pertaining to the drilling of wells in the Teas Pool in Sections 13 and 14, T20S, R33E, within the Potash-Oil Area, as defined by Order R-111-A, to provide an optional casing program that an operator may follow in lieu of the shallow-zone casing program set forth by Order R-111-A, as follows:

ROTARY TOOLS CASING PROGRAM

Surface casing to about 1,000 feet in the "Red Beds" section and cemented to the surface.

Production casing to be set below the base of the Tansill dolomite if a show of oil in the Yates is to be evaluated; this casing to be tacked with cement or cemented to the surface. If it is determined that commercial production has been obtained, said production string shall be cemented up into the surface casing. The top of the cement to be determined by temperature survey.

CABLE TOOLS CASING PROGRAM

Surface casing to be set into the top of the "Red Beds" and mudded in.

Cave casing string to be set in the "Red Beds" Chinle section if necessary and mudded in.

Water shut-off casing to be set through the Santa Rosa formation and into the Dewey Lake formation and cemented to the surface. The upper strings of casing mudded in, of course, would be pulled before cementing this.

The Production casing then to be set below the Tansill dolomite if a show in the Yates is to be evaluated; this casing to be tacked with cement, and if it is determined that commercial production has been obtained, said production string shall be cemented up into the surface casing, the top of the cement to be determined by temperature survey.

All requirements of Order R-111-A such as, well location, cement waiting time, casing tests, water shut-off tests, location of top of cement that fails to circulate, use of saturated brine to mix cement, and to drill the salt section, plugging and abandonment of wells, inspection of operations by the potash operator, etc. not specifically excepted shall be strictly followed for subsequent wells drilled in this pool.

As long as wells are being drilled in the Potash-Oil Area and oil operators conscientiously comply with the rules. An oil operator may be required to notify the potash operator holding rights on his lease in sufficient time that he may have a representative present for witnessing drilling operations, cementing of casing or plugging of wells drilled within this pool.

Applicant holds that the proposed drilling and casing programs

will permit more economic recovery of oil and potash minerals in the Teas Pool within the Potash-Oil Area and prevent waste, protect correlative rights and assure a maximum conservation of the oil and potash resources in the Teas Pool area.

I would like to point out that there have been 23 wells drilled in this -- I had better go on this map, within the pool boundary here and within the pool boundary which just includes the present productive area not including these wells down here.

MR. PORTER: By down here, you mean --

A Down here in Section 24 near the original discovery well.

MR. PORTER: In other words, the development has moved northwest?

A Yes, the principal productive area being a mile, more than a mile north and west from the original discovery well in Section 24. Further, that there probably won't be very many more wells drilled in this pool that the wells that we plan to drill can only be in Section 13 and possibly one or two in Section 14. That's all.

MR. PORTER: Anyone have a question of Mr. Warren? Mr. Nutter.

CROSS EXAMINATION

By MR. NUTTER:

Q Mr. Warren, I think you stayed pretty close to the text of your statement here except with a couple of exceptions. I want to be sure that I have these deviations down correctly. Now,

when you were reading your rotary tools casing program, that program as outlined on the sheet, surface casing to the top of the "Red Beds" and cemented to the surface, you amended that.

A I amended that to just 1,000 feet into the "Red Beds".

Q You just added the word 1,000 feet to that?

A Yes, sir. Specifying the depth, because that is below the lowest water that we have found. That is what the United States Geological Survey said they were going to require.

Q Now, on the next paragraph under rotary tools for production casing, there was no change?

A No, except for not cementing the production casing all the way to the surface. If we did cement could just be lapped up into the surface casing.

Q You mean this part here where it says if it is determined that commercial production has been obtained, said production string shall be cemented to the surface, you changed that to read shall be cemented up into the surface string?

A Yes, sir.

Q Is there any specific height that that cement must reach in the surface string proposed?

A I did not propose any. I said at least 50 feet above the shoe of the surface casing.

Q Fifty feet into the surface string, then?

A Yes, sir.

Q Now, on your cable tools casing program, your first paragraph there, surface casing to be set into the top of the "Red Beds" and mudded in or cemented to the surface.

A Just mudded in.

Q You eliminated"or cemented to the surface" from that?

A Yes.

Q Now, on your cable tools cave casing string, you didn't have any amendments to that, did you? A No.

Q Was there an amendment to the water shut-off casing paragraph there?

A Yes, instead of saying mudded in, said cemented to the surface and the upper strings of casing that were mudded in may be pulled, prior to cementing the water shut-off casing.

Q Now, your production string was the same except you had the amendment "shall be cemented up into the surface casing" again?

A Yes, sir. You might also say 50 feet up into it.

Q There was no further deviation from the written paragraph then was there? A No, sir.

MR. NUTTER: Thank you.

MR. PORTER: Anyone else have a question? Mr. Montgomery.

By MR. MONTGOMERY:

Q Mr. Warren, I notice that you were talking about United States Geological Survey, said they were going to require that you set the surface casing at least 1,000 foot?

A Yes.

Q What purpose was that for?

A Well, that's just what they said, that they weren't going to approve it unless we proposed it that way. In other words, they are not requiring that we set the surface, or cement the surface casing all the way to the top of the salt, because they agree with what I have found, that there is no water present below a thousand feet, and feeling that that depth would be safe enough in that area. Their reasoning, apparently they just feel that the cementing surface casing would be a more satisfactory cement job than circulating the oil string. I propose that possibly you'd stand a better chance of getting a cement job on an oil string, say a five and a half inch oil string in thirteen inch hole, which is what you would have down to below the water, than you would with eight and five-eighths casing in five and eight hole, because you would have more cement to put in there, and if the whole string is centralized in the anhydrite which would be within 300 feet below where your big hole is below the water, I would think you would stand a better chance of getting a cement job with the larger difference in diameter. But I have changed my proposal because that is what the United States Geological Survey said they would require.

Q With all due respects to the United States Geological Survey, I'm not questioning that. I was wondering why it was. Is it to protect the surface waters? I didn't really find out why it was.

A Yes, to keep water from getting down into the potash.

Q Into the potash? A Yes.

Q I didn't realize the potash was soluble in water.

A Well, I don't know. I know that the conference we had with the potash people, they didn't seem to be nearly as worried about the water as they were with the gas.

Q Do you know of any other place in southeast New Mexico where we have a field that requires a thousand foot of surface casing?

A No, sir.

Q What would be the expense of this 8-5/8 to be set at 1,000 foot?

A I would estimate it 1500 feet at between six and seven thousand, so it would be between four and five thousand.

MR. MONTGOMERY: That's all I have.

MR. PORTER: Anyone else have a question? Mr. Cooley.

By MR. COOLEY:

Q Mr. Warren, is there any federal acreage in the Teas Pool?

A Yes, it's all federal acreage.

Q It's all federal acreage?

A Yes, sir, I believe that was stated.

Q And the United States Geological Survey does approve, or disprove the casing programs on all wells drilled on federal acreage?

A Yes, sir.

Q And consequently any plan not acceptable to the United

States Geological Survey could not be drilled in these pools?

A That's right.

Q Now, have you sought and received United States Geological Survey's approval of your proposed plan?

A Yes. In conferring with them, I mean I have changed my original proposal because they have said they would require --

Q (Interrupting) It is your understanding that your proposal as it now stands is acceptable to the United States Geological Survey?

A That is right.

MR. COOLEY: That's all.

A Particularly with regard, or only with regard to the surface casing in regard to the salt protection string or production casing, they don't seem to have a firm belief one way or the other. That's my understanding.

MR. PORTER: Mr. Blackman.

MR. BLACKMAN: Roy H. Blackman, Carlsbad, New Mexico, representing Potash Company of America.

By MR. BLACKMAN:

Q Mr. Warren, you gave some data early in your statement as to the pay out time on a well in this area, and I wish you would kindly convert that, if you have the figures here, to value of expected production per acre, that you might get in a reasonably average well that you intend to drill.

A Yes, we have done a little figuring, and I would say that

our ultimate recoveries as estimated would be from about 40,000 barrels per acre, I mean 40,000 barrels per well for some of the poorer ones, and the way they are presently producing to a maximum of perhaps 100,000 barrels per well for some of those that have several zones productive.

Q Am I correct in understanding that the spacing is 40 acre spacing? A Yes, sir.

Q Would three dollars a barrel be a fair price to put on that for estimating purposes?

A Yes, for gross value.

Q Yes. A Yes.

Q So your value then would be from $120,000 per well to three times $120,000 or $360,000 per well? A Yes.

Q In the 40 acres? A Right.

Q Converting that to an acreage basis it would be from $3,000 an acre to four times that, wouldn't it, or three times that?

A Yes.

Q So that it would be from $3,000 an acre to $9,000 an acre, approximately. You mentioned that you thought rotary drilling in this area would be, might possibly result in shutting off the productivity of the pay zones. Do you plan any rotary drilling in this area? A No, sir.

Q One statement that you made, you plan to set a production string below the base of the Tansill, is that correct?

A Yes, sir.

Q Would below the base of the Tansill be below the pay zone?

A It could be. That's the reason I said it that way, below the base of the Tansill is either at the top of the Yates or in the Yates or near the base of it, yes, sir.

Q What I wanted to have you state was whether or not you proposed to drill through the pay zone prior to setting the casing?

A Yes. That's what I was asking for. I mean --

Q What you desire to do then is to drill through the pay zone and cement back and then selectively perforate the casings to the several pays? A Yes, sir.

Q May I ask you if it is possible, for instance, you mentioned in some of these wells that had been drilled before that they drilled to the top of the pay zone with an eight-inch hole, and then reduced to four or five inches to drill through the pay. Would it be possible to set a seven-inch casing on top of the pay and then go in with a reduced size hole setting your, a string of casing through the production and tie those two casings together, say you set a five-inch casing through the production, set those two together, is that what you call a liner?

A Liner, yes, sir.

Q Later selectively perforate your liner and go ahead with your completion of your well the same way. Would it be possible to do that? A It would be possible, yes.

Q The only question is the difference in cost?

A The difference in cost and, yes, it makes it a little complicated. Of course, it still comes back to cost. The complication is the additional cost.

Q I noted that one of your proposals was that if you set the production string inside of a, let's call it a water production string, that had been set down approximately 1,000 feet from the surface, that you only proposed to cement that production string back a minimum of 50 feet inside that water production string?

A Yes.

Q How much would you save by not cementing that clear back to the surface?

A Save about a third or probably $400.00 on the cement alone.

MR. BLACKMAN: That's all.

MR. PORTER: Anyone else have a question of Mr. Warner? Mr. Cooley.

By MR. COOLEY:

Q Mr. Warner, what would be the cost differential between completing a well as proposed and completing it with a liner as just outlined by Mr. Blackman? A Well --

Q Rough estimate.

A Oh, it could be, first you would have a difference between the five and a half and seven-inch casing; I know what five and a half cost, but not seven. I would think as a rough guess in

difference in casing price and the machine work on a liner, cementing probably $600 to $800.00.

Q I didn't hear you. A Six to eight hundred dollars.

Q You would still have a substantial saving?

A Wait a minute, I mean $1600 to $2,000.

Q $1600 to $2000? A Yes.

Q And I believe you estimated that if permitted to complete the well as proposed rather than as required by Order R-111-A, the saving would be something on the order of $6000 to $8000? What was your testimony?

A That was between six and seven thousand on the surface casing, yes, that's right. Between six and eight thousand dollars.

Q As proposed, the total savings would be six to seven thousand dollars cheaper than that program required by order R-111-A? A Yes.

Q So then if you took the third alternative, you would, the alternative of the casing liner as just discussed, you would still have a savings something in the order of four or five thousand dollars?

A Yes. Of course, there is another alternative, if we have to set the pipe on top of the Yates, that is on top of the pay zone, we can complete an open hole as most of the wells have been completed in the past. But I was trying to bring out that I would like to complete more of them with pipe through the pay zone for

selective perforating and treating.

Q You get better production that way?

A I think we will get better recovery in the long run.

MR. COOLEY: That's all the questions I have. The witness may be excused.

(Witness excused.)

Are there any other witnesses in the case?

MR. BLACKMAN: I suppose I'm going to have to make a statement or ask one of the gentlemen some questions.

(Witness sworn.)

IRA HERBERT

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

By MR. BLACKMAN:

Q Will you state your name, please, and your occupation?

A Ira Herbert, Chief Mining Engineer, Southwest Potash Corporation, Carlsbad.

Q How long have you held that position, Mr. Herbert?

A About seven years.

Q Prior to that time by whom were you employed?

A I was employed for about twenty odd years by the Fresnillo Company.

Q Where is that? A Zacatecas, Mexico.

Q I will not offer him as an expert witness. I just want to

ask him about the value of the potash. Are you familiar with the value of potash as we commonly calculate it, based upon the United States Geological Survey cut-off of commercial potash at four feet of 14%? A Approximately, yes.

Q Will you state approximately with whatever qualifications you care to put on it, the value of potash within the so-called potash zone per acre on the gross basis, or per foot of thickness, whichever way you care to state it?

A Well, on the average height of four feet at 14% cut-off, it would approximately be in the neighborhood of forty to fifty thousand dollars per acre.

MR. BLACKMAN: That's all.

MR. PORTER: Does anyone else have a question of Mr. Herbert? Mr. Cooley, do you have a question?

CROSS EXAMINATION

By MR. COOLEY:

Q Won't recovery of the oil from the Teas Pool preclude the recovery of the potash from that area?

A If carried on simultaneously, yes. If there was no blow-out of gas or oil into the salt zone or an entrance of water, it would stop the mining of potash.

Q My question was not whether simultaneous operation would be possible, but once the oil was recovered could the potash be recovered?

A I believe so, the wells properly plugged.

MR. PORTER: Mr. Montgomery.

By MR. MONTGOMERY:

Q How much potash ore is present in the Teas Pool area?

A I can't say. We are not in the area and I have no figures as to the results of the potash test hole drilling.

Q Would you say there is commercial potash in the area?

A It's in the United States Geological Survey potash area of commercial possibilities of 14%.

MR. MONTGOMERY: That's all.

MR. PORTER: Any further questions? You may be excused, Mr. Herbert.

(Witness excused.)

Mr. Blackman would like to be sworn.

(Witness sworn.)

ROY H. BLACKMAN

called as a witness, having been first duly sworn, testified as follows:

My name is Roy H. Blackman, I'm employed by Potash Company of America at Carlsbad, New Mexico in the capacity of resident counsel. Potash Company of America is the present permittee under Federal Potash Prospecting Permits of approximately 9,000 acres of land in Lea County, New Mexico, approximately in the area shown within the green boundaries on Applicant's Exhibit A. There's a good deal more than 9,000 acres within the green boundaries on Exhibit A, and in

general the southeasterly area shown on the map is not held by us under permit. We have applied to the Federal Government for a potash lease on that property, and leases have been offered to us by the Federal Government which are satisfactory to us and have been executed and returned to the Bureau of Land Management, and not having heard anything to the contrary, we assume that in due course the leases will be issued to us, I believe probably before the end of this year.

The lease area covers approximately four-fifths of the Teas Pool. There's a small portion of it, the east half of Section 15 in Township 20 South, Range 33 East, the southwest quarter of Section 24 in Township 20 South, Range 33 East, the west half of the southeast quarter of the same Section 24, the northwest quarter and the west half of the northeast quarter of Section 25 in Township 20 South, Range 33 East are not within the lease area. Otherwise, the Teas Pool comes within the lease area.

Under the applicable regulations of the Federal Government, I believe that this is all of the acreage that Potash Company of America is entitled to under the Reserve Acreage Provisions. It is true that our mine is about, oh, seventeen or eighteen miles to the west of this area. This area represents the location of a future mine if economic conditions are such that we can open up one at the time of the exhaustion of our reserves in our present location.

MR. PORTER: Anyone have a question of Mr. Blackman?

Mr. Nutter.

CROSS EXAMINATION

By MR. NUTTER:

Q Mr. Blackman, is this area within the Teas Pool here included in the five-year plan which Potash Company of America has submitted to the Conservation Commission?

A No, it is not. The five-year plan is the area where we plan to mine in the next five years, and this area in this Teas Pool, this entire area out here in Lea County is not within that area. It is down the road further than that.

Q Mr. Warren, when he was on the stand, stated that the nearest mine shaft was approximately ten miles away. How near are the actual mining operations to this area?

A I am not sure whether he was referring to Potash Company of America's shaft which is seventeen miles away from this or somebody else. I would have to refer to a map. I don't know how close the closest shaft is of somebody else's mine to this area.

Q Your shaft --

A Ours is seventeen or eighteen miles away.

Q How far are the actual mining operations away from this particular area?

A Again sixteen or seventeen miles away. There is no possibility of conducting any mining operation on this area through our present workings. It would require an entirely new mine.

Q That is more than five years down the road?

A That's correct.

Q You've heard Mr. Warren put in the record his proposed casing program for drilling a well with rotary tools in this area. Is that rotary tools casing program acceptable to the Potash Company of America as amended by Mr. Warren when he was on the stand?

A That is a very difficult question to ask me. I don't hold myself out as an expert how to give the best possible protection to the potash measures. It is my opinion that this is a very serious question for the Oil Conservation Commission and the people of the State of New Mexico.

Q Are we interested in giving the best possible protection, or adequate protection, the best possible protection would be to stay out of the area completely with your oil well?

A I think that is correct. You are correct.

Q We're after adequate protection right now.

A Perhaps our objectives are different. I still think we should give the best possible protection. I don't think this is the time to open up the entire wide question, but since you asked me the question, that is the way I feel about it.

Q Do you have objection to the rotary tools casing program presented by Mr. Warren?

A My feeling about that was inasmuch as he didn't plan on any rotary tools, I would recommend that the Commission enter an order

which did not grant any exemption to R-111-A with respect to rotary tools.

Q With respect to the casing tools program proposed, the cable tools casing program proposed by Mr. Warren, do you have objection to that program?

A Again it's a question of gaining the best protection which is possible.

Q Is this adequate protection?

A I don't know whether it is or not.

Q You are not objecting to the program then, are you?

A I am not going to enter a formal objection to the program, no, sir. I wanted to point out what I think are the elements which should be considered very carefully in this case, but I believe that the question of what constitutes the best possible protection that can be given, or adequate protection, if that is the disposition of the Commission, is best decided by the engineers who have had a good deal more experience with it.

MR. COOLEY: Thank you, Mr. Blackman.

MR. PORTER: Anyone else have a question of Mr. Blackman? You may be excused.

(Witness excused.)

Anyone else desire to present testimony in this case? Any statements you would like to make?

MR. PIERSON: Frank Pierson, United States Potash Company.

I have here a letter which I would like to enter into the record. It is addressed to New Mexico Oil Conservation Commission, Mabry Hall, dated October the 16th of 1957.

"Dear Sirs:

It is felt by the United States Potash Company Division of United States Borax & Chemical Corporation, that after careful consideration it does not appear advisable to deviate from the Oil Conservation Commission regulation known as R-111-A governing the conservation of potash and oil. Since the Teas Field is inside the area controlled by this Order, we feel that no exceptions to this Order should be made.

It is felt that protection should be afforded at this time to the salt section, both from the danger of water from above and water, gas or oil from below. This protection is afforded by the Order R-111-A and consequently, we feel that it would be to the best interests of all concerned if the Order was held in compliance. Very truly yours, Earl H. Miller, Resident Manager."

MR. PORTER: Does anyone else have a statement?

MR. COOLEY: Mr. Pierson, what are the nearest holes of the United States Potash Company to the Teas Pool?

MR. PIERSON: They have three state leases known as M-651 which are less than a mile from the western edge of the Teas Pool.

MR. BLACKMAN: I should like to make a short statement. Potash Company of America is in this case in a little different

position than the rest of them inasmuch as the Teas Pool, four-fifths of it comes within this reserve lease area we have. Of course, the potash operators are pretty cagey with the information that they give out about the value and thickness and quality of the potash that they locate by drilling, and subsequently get leases on. However, we feel with the information that we have at hand, that this reserve area that we have leased out there is perhaps the best of the areas within the, what I call generally the reserve area, the area where future potash production is coming from when the present area about fifteen miles, roughly ten or fifteen miles to the west of this area is all mined out.

I showed here the value, the relative value of potash per acre and oil per acre in this particular area. Mr. Herbert's question was posed to him on the basis of four feet of 14%. This whole potash area that we have has reference to our general records will show is bounded by that four feet of 14% cut-off, all of the information on that particular series of maps that you have here and the Commission having been furnished through the United States Geological Survey, it's necessary when a well is drilled to leave a substantial pillar around the bottom of that well. That pillar is of 100 foot radius and of minimum grade potash will work out some place in the neighborhood of fifty to forty thousand dollars in lost potash there.

I think if you go back to the last case that we had here

on the effects of subsidence we will be losing roughly 25% of the potash if the oil is not completely removed and the hole all plugged, so that the mining can be conducted and be subsidence, I mean the lower supporting members removed and the area allowed to subside. I don't believe that you could have any oil well production in an area where there was subsidence. I think that was completely proven in the other case.

We feel this is a problem which the Oil Conservation Commission is going to have to work out, and we would go along with anything that is reasonable under the circumstances. We just think that whatever the engineering staff of the Oil Conservation Commission and the United States Geological Survey figure can be done to give all possible protection to the potash measure, certainly should be done in the interest of conservation.

Now, I would like to make a specific request inasmuch as we are not yet lessees, we would like to be named in an order as being the recipients of notice on behalf of the lessee at all critical periods such as when he proposes to set any casing or when he proposes to pull and plug things of that kind where we would like to have somebody on hand to see it is properly done, and as a second request, I should like to request that the Oil Conservation Commission designate one of its field engineers to be present at the plugging of any wells in this area in order to insure that they are properly plugged and that we have a representative of this

Commission on hand to make sure that that is done.

MR. PORTER: In other words, Mr. Blackman, you don't qualify to receive notice in view of the fact that you don't have leases within a mile, but you would like to have those notices?

MR. BLACKMAN: That's correct.

MR. PORTER: Mr. Cooley.

MR. COOLEY: Mr. Frost, in this area under discussion, is Federal acreage, and that Federal approval that any casing program must come from the United States Geological Survey, I wonder if you would care to comment at this time on the casing program as proposed by Mr. Warren.

MR. FROST: First we might go back and mention that this R-111-A which we're operating under now was a concession possibly on the part of the potash people to some requirements and things. That order as written was worked out and approved off the record by the potash companies and the oil operators, and then came to the Commission to have that particular order approved by the Commission, which in turn was the minimum requirements to meet, we will say, the objection of the potash companies to drilling within the oil-potash areas.

The potash is a natural, we'll say reserve, there, and a resource which deserves proper protection by all regulatory bodies. So the Department higher up on the Washington level is confronted with potash and also, and also the oil and gas. In this

particular case I am in the Oil and Gas Division of the Interior Department, and we look at the natural resources must be protected whether it is oil and gas that I am in or the other division, Potash Mining Division, so we're faced at times with trying to evaluate the two resources.

Certainly in this case where the potash is worth many times more than the foreseeable value of the oil, again, the proper precaution must be taken to protect that natural resource. This slight change in here to run pipe to not less than 1,000 feet from all of the wells that has been drilled, it appears that that would more than penetrate all the water zone in the area, that is the Teas Pool area, and the cave up above and in that way would adequately exclude the possibility of water coming down to the top of the salt and getting into the potash salt-bearing, or the potash and salt-bearing area at some future date. Naturally water above would be a great hazard to the potash operator if he went and found the wells weren't plugged at some future date, or like a proper protection would let water in to the salt and potash-bearing area which might destroy the potash mining operations at that time.

So at least we feel that the R-111-A to cement a string of pipe on top would protect all parties is a must. Does that answer it?

MR. COOLEY: Not as to the surface casing, also there is a requested deviation in the production casing I believe.

MR. FROST: Well, at the time R-111-A was worked out and agreed to among all interested parties, there's very few cases out in that part or within the oil-potash area, where the oil operator was drilling to the oil zones to find out how many different zones might be productive, or at least oil in the cores and things, and the common practice many places now is to drill through the horizon that might contain two or three zones. That interpretation of the electric log and then sand fract it, that didn't come up at the time R-111-A was being revised, so if you follow R-111-A as it was approved by all interested parties and then the Commission approved their findings, or what they would agree to then, you can not drill through the productive zone and cement your pipe and perforate through it. The order says not below the first known producing horizon within the Yates. So there is where your engineers will differ, it's becoming common practice in oil fields.

Whether oil standing on the potash itself over twenty-four or forty-eight hour periods, something like that, which would be necessary to run a cement pipe is really a hazard, the engineers will disagree over that. It has been done, that is you get outside the oil-potash area that is a common practice to drill through and cement your, and perforate;in that case you would have cement back to your casing, but in all southeast New Mexico the potash engineers consider that a hazard, until such time as the oil engineers and the potash engineers get together on that particular point, why

it's a debatable question.

MR. PORTER: Mr. Herbert, would you take the stand again?

IRA HERBERT

recalled as a witness, testified further as follows:

RE-DIRECT EXAMINATION

By MR. COOLEY:

Q Mr. Herbert, I would like to know your opinion of this matter of oil standing in the hole for twenty-four to forty-eight hours period of time adequate to permit running of production string.

A Personal opinion, it would do no harm maybe up to three or four days providing it was not under any heavy pressure, extremely high pressure, why the salt could be penetrated.

Q You are aware that there are no high pressures in the Teas Pool, aren't you?

A Yes, evidenced today, that's all. I'm not aware on my own checking on the matter, no.

Q It occurred to me, Mr. Herbert, from my experience in previous potash cases concerning subsidence, that it would certainly be impossible to attempt to mine the area in the Teas Pool until such time as all oil and gas operations had terminated and all those wells plugged and abandoned, is that correct?

A For maximum recovery, yes.

Q Would you think it possible to mine in an area of an oil

pool drilled with one well drilled to the density of one well for 40 acres? You think any mining operation could be conducted successfully with an oil field fully drilled up in the area?

A I believe on proper planning you could do it. You would sacrifice efficiency in your mining operation if we had to leave pillars around a well in every 40 acres. We are planning probably to do some of that type of mining which our recovery will be very small and rather inefficient, but I believe it can be done. You wouldn't eliminate, what I'm trying to say, you would get the part of your potash, but not the maximum.

Q You have seriously considered at some future date entering on such operation? A Yes.

Q I believe in previous cases you testified that that pillar would be something on the order of 100 feet in radius?

A Yes, at least 100 feet in radius. Of course, if you have, may I amend it a little bit, if you have two wells which we do extremely close together, sometimes your radius overlaps, it doesn't mean that you can leave a pillar in between, which I believe was brought out in the last case we had here.

Q Then the great danger would be not the liquids, either water or oil reaching the potash horizon, but rather a possibility of gas escaping into the opening workings and making it a safety hazard?

A That's right. Also, though, if you do have your salt area

where your potash ore body is has become charged, then immediately when you start mining in it you have the danger of probable oil and gas.

MR. COOLEY: Thank you very much.

MR. PORTER: Anyone else have a question of Mr. Herbert? You may be excused.

(Witness excused.)

Anyone have anything further to add in this case? Any more statements, comments? We will take the case under advisement. After a short recess we'll take up Case 1327.

(Recess.)

C E R T I F I C A T E

STATE OF NEW MEXICO)
: SS
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, do hereby certify that the foregoing and attached transcript of proceedings before the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, is a true and correct record to the best of my knowledge, skill and ability.

IN WITNESS WHEREOF I have affixed my hand and notarial seal this 2nd day of October, 1957.

Ada Dearnley
Notary Public-Court Reporter

My commission expires:
June 19, 1959.